

**LILIOCERIS SP. (COLEOPTERA: CHRYSOMELIDAE)
HERBIVORY ON *CYCAS SIAMENSIS* MIGUEL
(TRACHEOPHYTA: CYCADALES)**

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Abstract.—The chrysomelid *Lilioceris* sp. was found feeding on the leaflets of cycads in northeastern Thailand. Many cycads were significantly damaged. Larval and adult *Lilioceris* sp. coloration suggests aposematic coloration.

Key Words.—Insecta, Chrysomelidae, Cricocerinae, *Lilioceris*, cycad, herbivory, aposematic coloration

Beetles are increasingly being associated with cycads either by entomologists (Crowson 1991) or by cycadologists (Norstog 1990). Most species either bore through the frond rachis or the trunk, or they attack the cones. Several species have been demonstrated to be pollinators. One species of chrysomelid beetle, *Lilioceris clarki* (Baly), has been reported to feed on the fronds of *Cycas* sp. in New Guinea (Szent-Ivany et al. 1956). Here I report *Lilioceris* sp. larvae feeding on the frond leaflets of *Cycas siamensis* Miquel in Thailand.

The cycads were part of the understory vegetation of a “dry dipterocarpus” forest located along Highway 213, 2 km south of the headquarters of Phu Phan National Park, Sakhon Nakhon Province, in northeastern Thailand. The cycads were numerous and easily seen as a fire some months previously had reduced the understory cover. I estimated that about half of the cycads had either beetle larvae actively feeding or bore evidence of their feeding. Infested cycads usually supported only a few larvae (> 10) on a few fronds, although some had heavy infestations (20+ larvae) and abundant frond damage (Fig. 1). In both cases there always were nearby cycads that had no larvae. Infested cycads could be distinguished easily from a distance as the damaged leaflets were a pale brown color that contrasted sharply with the dark green of undamaged leaflets (Figs. 2–3, 5). Infested cycads were located both in and outside of the burn area. The fire may have made the cycads more visible to the beetles as the infestation was generally heavier in the burn area.

Lilioceris sp. was present mainly as larvae. One adult was swept from the cycads. All larvae were located on the lower surfaces of the leaflets (Fig. 4). Feeding involved rasping away the lower epidermis and part of the mesophyll. Generally larvae only ate part of the tissue of any one leaflet before leaving to find another. However, when larval numbers were high the larvae remained on single leaflets until they were substantially consumed. On one heavily infested frond, the end of the rachis was chewed through. The ground under the cycads with heavy infestations was carpeted with feces (Fig. 6) which had a characteristic coiled shape both when being eliminated by the larva and when on the ground. One larva was dissected to examine the structure of the digestive tract. It was typical for herbivores, being voluminous in capacity, long and coiled. Attempts to rear larvae to adults in the lab failed due to lack of a proper pupation site,



Figure 1. *Cycas siamensis* frond heavily damaged by *Lilioceris* sp. larval herbivory. This frond has 20 larvae showing.

Figure 2. *Cycas siamensis* with heavy damage caused by *Lilioceris* sp. larvae feeding on frond leaflets. Note end of rachis is chewed through.

Figure 3. *Cycas siamensis* leaflets discolored by herbivory on the lower sides.

Figure 4. *Lilioceris* sp. larva on underside of leaflet of *Cycas siamensis*.

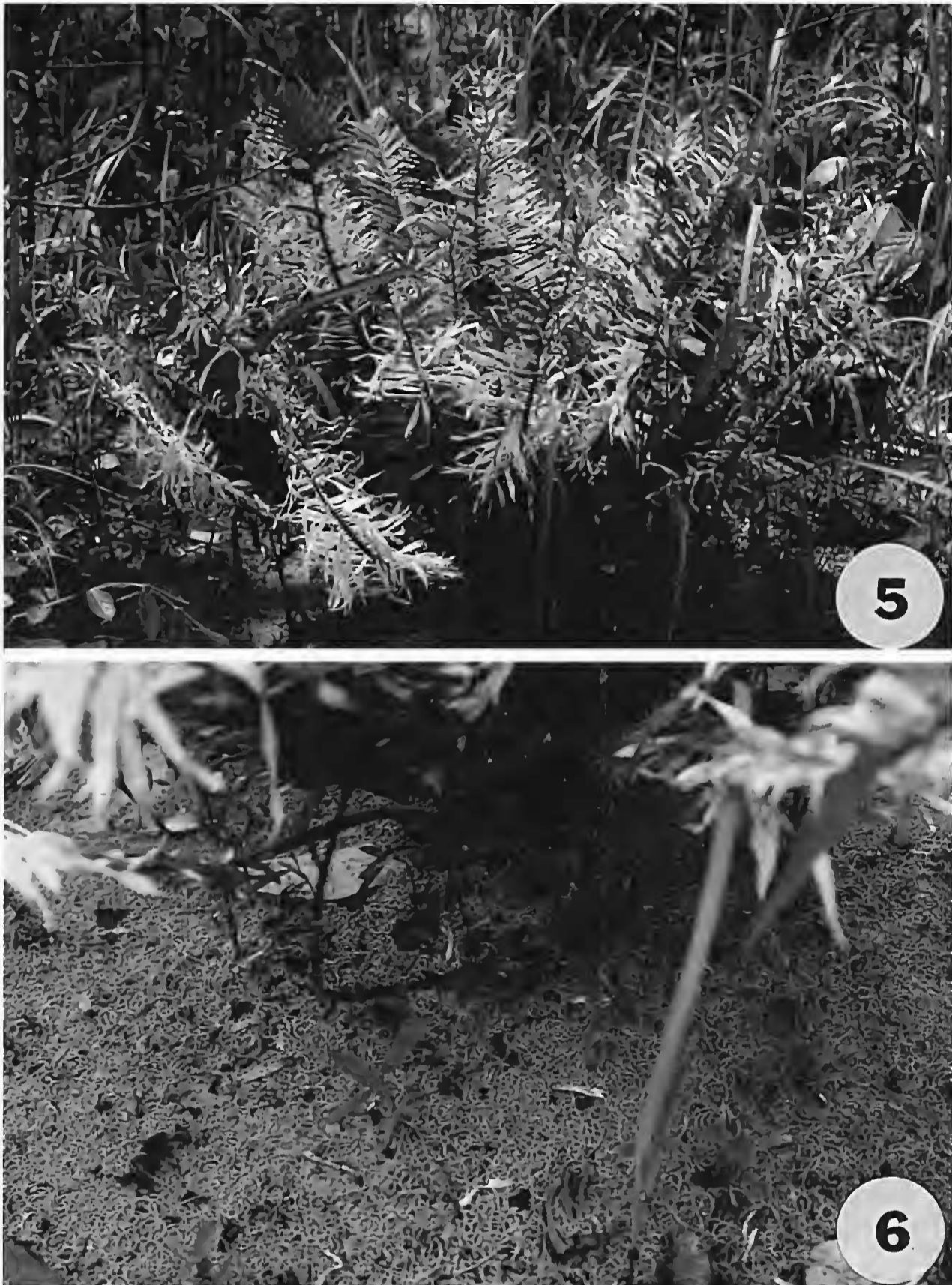


Figure 5. *Cycas siamensis* fronds heavily damaged by insect herbivory.

Figure 6. Accumulation of beetle larva feces under a heavily infested *Cycas siamensis*.

which is thought to be the soil. Reared larvae that reached what appeared to be the last instar climbed down from the fronds and crawled around the laboratory.

Larvae were bright red-orange in color and visible against the darker foliage, suggesting aposematic coloration warning of chemical defenses. Chemicals may be sequestered from the cycad tissue as they are known to have chemical defenses. None of the larvae evidenced signs of predation attempts or parasitism. When disturbed they remained immobile on the leaflets. The single adult *Lilioceris* sp. was also a bright red-orange in color.

Voucher specimens deposited at the Entomology Collection at California Academy of Sciences (San Francisco) include one adult and five larval *Lilioceris* sp. plus several cycad leaflets fed upon by the larvae.

ACKNOWLEDGMENT

Special thanks go to Samang Homchuen who shared with me her wonderful country and its flora. Edward Riley provided the identification of the chrysomelid and a copy of Crowson's paper. Travel to Thailand was provided by United States Information Agency Grant # IA-ASCS-G1190232.

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Received 21 Feb 1996; Accepted 16 Jun 1996.